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Significant Physical Facilities in North Vietnam
September 1969

29 Sep 69 Typescript IM, Significant Physical Facilities in North Vietnam, 29 Sep 69 (distribution list attached)

29 Sep 69 Carver to Dr. Laurence Lynn, NSC, re North Vietnam
Target Inventory (in response to request for inventory
of major NVN physical facilities as potential targets)

Attachment: Typescript IM, Significant Physical Facilities in North Vietnam, 29 Sep 69

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29 September 1969

MEMORANDUM FOR: Dr. Laurence E. Lynn, Jr.
Assistant for Programs
National Security Council

SUBJECT : North Vietnam Target Inventory

1. In response to the request you levied during the course of our conversation on Friday, 26 September, attached is an inventory of major physical facilities in North Vietnam that could be viewed as potential targets. As you know, this inventory was prepared on short notice and the number of people working on it was held to an absolute minimum for security reasons. It should, therefore, be viewed as a quick rough cut rather than a finished study.

2. Per your ground rules, we did not address the probable political consequences or reactions of the North Vietnamese or others (e.g., the Soviets, Chinese, Western Europeans, South Vietnamese, other Asians, etc.) of attacks on any or all of these targets, though in some instances the near certainty of strong international reactions to attacks on certain targets is alluded to.

3. In the concluding paragraphs of the attached memorandum we do attempt a brief and summary analysis of the impact a loss of the inventoried facilities would have on North Vietnam. The key judgment here is a judgment derived from the analytic review of all available evidence undertaken in the course of preparing this paper and buttressed by our continuing analysis of evidence developed over the course of the years since 1965: namely that even destruction of all these facilities would not make it physically impossible for North Vietnam to continue the war. Thus, physical constraints would not foreclose Hanoi's options or necessarily dictate Hanoi's political response to such attacks.

George A. Carver, Jr.

Special Assistant for Vietnamese Affairs

Attachment

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
29 September 1969

INTELLIGENCE MEMORANDUM

Significant Physical Facilities in North Vietnam

Introduction

Prior to 1965 North Vietnam offered only a limited number of lucrative targets for air attack. With the initiation of the Rolling Thunder program, the catalogue of significant installations became even more limited because of the damage sustained during the bombing programs and North Vietnam's extensive programs of dispersal and decentralization of key economic and military facilities. Since the bombing halt a number of the more important facilities have been restored or improved. This memorandum examines the current state of North Vietnam's economic and military plant in an attempt to identify those installations whose loss or neutralization might have a meaningful impact on the capability and willingness of Hanoi's leadership to continue with the war.

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I. North Vietnam as a Target System

1. The number of fixed facilities against North Vietnam that offer significant targets for air attack is limited. The economy of North Vietnam is essentially agrarian, lacking for the most part an indigenous economic base heavily committed to the support of military operations. Hanoi maintains a relatively small military establishment, and its primary contribution to the war in the South is in the provision of manpower and in serving as a control center for the direction of insurgency. In almost all other respects Hanoi's war making capabilities are dependent on the continued flow of military and economic goods from its Communist allies.

2. As a result of the previous US bombing campaigns and the countermeasures adopted by the North Vietnamese, the number of lucrative targets has fallen off since 1965. The pace of reconstruction has been slow and deliberate, not only because of the scope and complexity of the task but also because the regime appeared reluctant to rebuild large industrial targets until it was relatively confident that the bombing would not be resumed. Repair activities at such important plants as the Thai Nguyen Iron and Steel Complex and the Bac Giang Chemical Fertilizer Plant have been at such a slow pace that neither facility is yet restored to the point that it would be a significant target. In other cases, such as the heavily damaged Nam Dinh Textile Plant and the Co Dinh Chromite Concentrating Plant, no reconstruction activity has been noted.

3. Another factor limiting the number of significant targets has been the extensive dispersal programs adopted to offset the effects of previous air attacks. Most of the major military barracks and ammunition and supply depots, for example, were dispersed early in 1965 so that when these target systems were taken under systematic attack the results, in terms of human or material losses, were minimal. Similarly, the early establishment of a widely dispersed petroleum storage system so effectively offset the destruction of North Vietnam's bulk storage system that most of these facilities were left unrepaired. As a result there are today probably only three petroleum storage areas -- Hanoi, Haiphong, and Vinh -- that are of some significance as potential targets. The widespread dispersal of small facilities such as vehicle repair and machine tool shops, as well as the relocation of some industrial plants has further reduced the number of installations available for air attack.

4. An important characteristic of the remaining target systems is that the most important of them would be considerably more difficult to take under attack today than they were during the Rolling Thunder program. All of the power stations in the

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main electric power network, for example, have had protective blast walls constructed around them so that they are considerably less vulnerable to effective air attack. In addition a number of the more significant facilities are located in the heavily populated and heavily defended areas around Haiphong and Hanoi. Attacks against these targets not only risk the inadvertent killing of large numbers of civilians but also significantly increase the chances that losses of US pilots and aircraft will be extremely high. During the period from April 1967 to March 1968, targets in the Hanoi and Haiphong areas came under frequent attack. The US aircraft loss rate in these attacks was 7 times greater than the rate for operations over all of North Vietnam.

II. Major Facilities

5. This section discusses a selected number of facilities in North Vietnam that seem to be significant because their neutralization or destruction by air attack would meet one or all of the following objectives:

- a. A high degree of physical damage or extensive disruption of an important economic or military function.
- b. The implementation of countermeasures or restoration of the facility would be costly in terms of human and material resources.
- c. The attack could be expected to have a strong psychological impact on Hanoi's leadership.

6. The 29 installations selected are listed in the table.* The list is not intended to be all-inclusive but is judged to be one which would offer reasonably good prospects of maximizing the attainment of the above objectives. The specific targets are listed under several target systems and are listed by order of priority. The allocation of priority is obviously a highly subjective procedure, but the ranking in this listing is supported to some degree by the fact that it reflects the speed and intensity with which Hanoi chose to restore its bomb damaged facilities both during and after the US bombing campaigns. Although each installation is given a separate numerical ranking in many cases a successful campaign would require that several or all of the facilities in any one category be attacked simultaneously.

* Table follows on Page 11.

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Haiphong Port Area

7. The Haiphong port area was virtually untouched throughout the bombing campaign. The port is, however, of major significance because it is the entry point for about 85 percent of North Vietnam's annual imports. These imports are vital to the economy and are essential to the maintenance of lines of communication within North Vietnam. In addition, the Haiphong port area includes five shipyards, a naval base, an air defense center, a major railroad yard and six major storage areas. An initial attack in the Haiphong port area would be almost certain to destroy large quantities of stockpiled supplies. Although these supplies cannot be quantified with any precision, it is probable that at least 50,000 tons of miscellaneous cargoes are stored in the port area at any one time. The immediate disruption to established distribution systems resulting from a successful attack would be widespread and severe, and if the port area were kept under attack alternative means of importing goods and distributing them internally could not be implemented for at least 2-3 months. The attacks could not be expected to yield any long term reduction in the flow of imports into North Vietnam because of the existence of alternative means of supply such as the overland rail and highway connections with China or the use of other ports such as Hon Gai and Cam Pha.

8. There are important liabilities associated with this target system. It is so heavily defended that losses of US aircraft would undoubtedly be high. Since all of the targets are located within a radius of 1.5 miles from the center of Haiphong, a high number of casualties among North Vietnamese civilians probably could not be avoided. Finally, the attack would stand a high chance of damaging or sinking foreign shipping in port and conceivably forcing a US-USSR confrontation.

9. A variant to bombing the port facilities would be a mining program. A mining program would, of course, not yield the high levels of physical damage resulting from bombing. It would, however, avoid most of the risks associated with bombing and would be about as effective in terms of the disruption of North Vietnam's import trade and internal transport arrangements.

Electric Power System

10. The importance to North Vietnam of its electric power system is evident in the persistency with which it attempted to keep the main power system operative throughout the bombing, the measures (protective blast walls) devised to reduce its vulnerability to bombing, and the priority attached to restoration of

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these facilities after the bombing halted. Although all electric power stations have significance as targets, the following stations were selected because they are the ones in which Hanoi has made the greatest efforts to regain pre-bombing generating capacity:

<u>Electric Powerplant</u>	<u>Pre-Bomb Capacity (Megawatts)</u>	<u>Operational Capacity (Megawatts) August 1969</u>
Hanoi	32.5	25
Uong Bi	24	24
Haiphong West	10	5
Hon Gai	15	6
Thai Nguyen	24	12
Bac Giang	12	12

11. The neutralization of these plants which constitute North Vietnam's main power network and represent a capital investment of about \$30 million would cripple most of North Vietnam's modern industry. The impact of bombing North Vietnam's electric power system would be maximized if strikes were carried out against all of these plants simultaneously. Successful attacks would not only undercut the results of 18 months of accelerated repair activity but would mean that another one to two years would elapse before the system could again approach pre-bombing capacity. The reconstruction effort is beyond the capabilities of North Vietnam's limited material and technical resources, particularly technicians. Even the resort to alternative power systems such as diesel-driven generating equipment would be adequate to meet only essential needs and would preclude the early restoration of normal industrial production. In addition the attacks could have a significant impact on the urban population of North Vietnam because of need to stagger work shifts to eliminate or strictly ration consumption by residential-commercial users, and transportation.

Airfields

12. Four of North Vietnam's ten jet airfields are judged to be significant targets. These are the airfields at Phuc Yen, Bai Thuong, Kien An, and Yen Bai. The airfields at Bai Thuong and Yen Bai have been under construction since May 1966 and were serviceable by May 1968. The Kien An and Phuc Yen airfields have been fully repaired and improved since the bombing halt. The construction of aircraft shelters and hardened facilities at these fields since the bombing halt has greatly increased their

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operational flexibility. North Vietnam currently has an estimated 52 MIG-21's, 53 MIG-15/17's, 10 MIG-19's and 4 Il-28 bombers deployed in-country. All but one of the MIG-21's, as well as all of the bombers, and two-thirds of the remaining jet fighters are deployed at these four airfields. About two-thirds of these aircraft are deployed at Phuc Yen alone.

Haiphong Cement Plant

13. The Haiphong Cement Plant has an annual production capacity of 700,000 tons and its estimated replacement cost is \$30 million. It was one of the first industrial plants to be repaired after the bombing halt and it is currently operating at 50 percent of capacity. The plant is an important factor in North Vietnam's reconstruction program and as capacity is further restored should once again become an important source of foreign exchange. Severe damage to the plant would require more than a year to repair. Loss of production also would mean that North Vietnam would have to import about 400,000 tons of cement annually to meet domestic requirements.

Cam Pha Coal Preparation Plants

14. Although this plant has been repaired since the bombing halt, coal exports have not reached more than half the levels of pre-bombing years. The failure of the coal industry to achieve pre-bombing production levels has been a matter of great concern to Hanoi and the subject of numerous commentaries in the Vietnamese press. Coal exports in past years have accounted for hard currency foreign exchange earnings of \$8-10 million a year. Successful attacks against the Cam Pha facilities would be an effective means of frustrating Hanoi's attempt to revive the export trade of one of its major hard currency earners.

Hanoi Machine Tool and Engineering Plant

15. This plant built as a Soviet aid project in the late 1950's and expanded with Soviet assistance in 1966 is the largest and most sophisticated machine building plant in the country. It is valued at about \$8 million.

16. The plant has not been bombed previously because it is located in a heavily built-up area of Hanoi. Although we are uncertain as to the extent that its production has been dispersed, the plant is undoubtedly a significant factor in the maintenance of transport equipment. A successful strike against the plant should eliminate a large share of the country's output of diesel motors, small electric motors, generators, water pumps and spare parts.

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An attack against this previously unstruck plant would undoubtedly have a deep psychological impact on Hanoi's leadership. It would, moreover, deprive North Vietnam of a major industrial facility regarded as one of the economy's showpieces of advanced technology.

Storage Facilities

17. There are a few important storage facilities that would make lucrative bombing targets. The yield from attacks on these targets would probably drop sharply after the initial attack, since the North Vietnamese would quickly revert to their practice of storing supplies in small and widely dispersed storage areas. Nevertheless, the initial attacks would probably cut deeply into North Vietnam's current cushion of essential goods such as petroleum, trucks, foodstuffs and construction materials.

18. The storage facilities selected are the following:

- Haiphong Chamber of Commerce Wharves
- An Khe Army Barracks
- Haiphong Petroleum Products Storage
- Hanoi Petroleum Products Storage
- Vinh Petroleum Products Storage

19. The storage facilities at Haiphong would represent a rich target in an initial surprise attack. At least 50,000 tons of supplies, much of it high value imports, are stored in these facilities at any one time. The storage facility at An Khe is occupied primarily by cargo trucks. Although there is a rapid turnover of vehicles at An Khe the number in storage at any one time is high ranging from about 800 trucks in May of this year to over 1,300 trucks in early August. The petroleum storage facilities at Hanoi and Haiphong are under reconstruction and by June 1969 these facilities had an estimated storage capacity of 37,000 tons. If this capacity is being fully used these facilities would account for almost 40 percent of North Vietnam's estimated stockpiles of petroleum. The facility is significant because it is a major source of petroleum supplies for the Panhandle areas of North Vietnam.

Transportation Targets

20. There are a large number of bridges along North Vietnam's lines of communication whose neutralization would impede the internal distribution of economic and military supplies. For the most part interdiction of these bridges would be only a minor harassment. The North Vietnamese have demonstrated extreme skill in offsetting the effects of previous interdiction and during the bombing raids a great deal of redundancy into

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their transport system. There are, however, three bridge targets that play key roles in maintaining the flow of Hanoi's imports either overland from China or through the port of Haiphong. These are:

Hanoi Railroad/Highway (Doumer)
Bridge over Red River

Hanoi Railroad/Highway
Bridge over Canal des Rapides

Haiphong Railroad Bridge
at Hai Duong

21. All of these bridges could be easily by-passed and the disruption to normal traffic flows would not be sustained for a long period. The importance of interdicting these bridges could become highly significant, however, if they were attacked simultaneously with an interdiction of the Haiphong Port area through a bombing or mining program.

22. In addition to these bridge targets, the major rail yards at Hanoi and Haiphong represent significant targets in North Vietnam's transport system. Successful attacks could achieve significant results in terms of damage to equipment and supplies. These rail complexes not only contain large quantities of materials but account for the bulk of North Vietnam's capacity for the repair of rolling stock and equipment. The effects of these strikes would be short-lived. Traffic flows could be resumed within days and needed transport equipment could be imported from Communist China.

Levees in the Red River Delta

23. The rice fields and populated centers of the delta are protected by an elaborate system of levees which have greatly reduced flooding from natural causes. A successful attack against the dikes in the Red River Delta could, at the proper time of the year, have exceedingly disruptive effects in the short run.

24. A highly successful campaign could destroy as much as 25 percent of the annual rice crop. Most economic and military activity in Hanoi and its suburbs would be temporarily halted. Key transport routes leading south and west from Hanoi would be disrupted. Sizable diversions of labor would be necessary for a period of weeks to repair flood damage.

25. The most significant results would be accomplished by a

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breaching of the levees during the high water period between mid-July and mid-August. The fact that this period has passed explains the bottom ranking of this target system. But, the levee system is also given a low ranking because the technical problems of breaching levees by aerial bombing are so complex and the required sortie and ordnance effort so large, that such an attack generally holds little promise of success. In addition, the certainty of extremely adverse international reactions to the bombing of dams and dikes would be extremely unfavorable to the United States.

III. Conclusions

26. A review of economic and military facilities in North Vietnam has resulted in the selection of 29 installations that could be significant targets for air attack:

Five complexes in the Haiphong Port Area

Six electric power stations

Four airfields

Three manufacturing facilities

Five storage facilities

Five transportation targets

The levee system in the Red River Delta

27. The loss or neutralization of these facilities could have a deep psychological impact on Hanoi's leadership. Renewed air attacks would not only signal a return of the hardships and frustrations of previous bombing programs but also would yield significant amounts of physical and material damage. The fruit of several hundred million dollars in capital investment and post-bombing reconstruction programs would be lost. Most modern industrial production would come to a halt as would most foreign exchange earnings. The potential loss of large quantities of essential economic and military goods would increase sharply North Vietnam's import requirements. Finally, there would be extensive disruptions to normal living, to the provision of public services and transport, and substantial displacements of both urban and agricultural labor forces.

28. Despite the possibilities of widespread damage and loss, the neutralization of these facilities would not have a vital impact on Hanoi's war-making capabilities. These facilities make

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little direct contribution to the war because, with the exception of manpower, North Vietnam's military capabilities depend overwhelmingly on the continued flow of large amounts of economic and military assistance from its Communist allies.

29. The impact of attacks on these facilities would be highly dependent on the manner in which the program is executed. Hanoi has demonstrated an exceptional ability to adopt effective countermeasures to US bombing programs. Attacks against only one or two facilities in a target system would minimize the possible damage and fail to bite deeply enough into the available cushion of supplies or resources, thus easing the problems of recuperation. Therefore, an attack against all the facilities in a given target system (such as all powerplants) would be a more promising means of exerting pressure against the Hanoi regime. In other cases, the results to be expected from attacks against one target system (such as lines of communications) are maximized if they are combined with attacks against a complementary system (such as the Haiphong port facilities).

30. A neutralization program against these facilities would also carry liabilities. Most of the facilities are within heavily defended and densely populated areas around Hanoi and Haiphong. Attacks in these areas run a heavy risk of high losses of US aircraft and their crews, as well as the inadvertent killing or injuring of large numbers of Vietnamese civilians.

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Table

Significant Targets in North Vietnam

Haiphong Port Area

1. Haiphong Docks
2. Haiphong Open Storage Areas
3. Haiphong Naval Base
4. Haiphong Shipyards
5. Haiphong Air Defense Center

Electric Power Stations

6. Hanoi
7. Uong Bi
8. Haiphong West
9. Hon Gai
10. Thai Nguyen
11. Bac Giang

Airfields

12. Phuc Yen
13. Bai Thuong
14. Kien An
15. Yen Bai

Manufacturing Facilities

16. Haiphong Cement Plant
17. Cam Pha Coal Preparation Plant
18. Hanoi Machine Tool and Engineering Plant

Storage Facilities

19. Haiphong Chamber of Commerce Wharves
20. An Khe Army Barracks
21. Haiphong Petroleum Products Storage
22. Hanoi Petroleum Products Storage
23. Vinh Petroleum Products Storage

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Transportation Targets

- 24. Hanoi Railroad/Highway Bridge over Red River
- 25. Hanoi Railroad/Highway Bridge over Canal des Rapides
- 26. Haiphong Railroad Bridge at Hai Duong
- 27. Hanoi Rail Classification Yard
- 28. Haiphong Rail Yards

Agriculture

- 29. Levees in Red River Delta

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
29 September 1969

INTELLIGENCE MEMORANDUM

Significant Physical Facilities in North Vietnam

Introduction

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2. As a result of the previous US bombing campaigns and the countermeasures adopted by the North Vietnamese, the number of lucrative targets has fallen off since 1965. The pace of reconstruction has been slow and deliberate, not only because of the scope and complexity of the task but also because the regime appeared reluctant to rebuild large industrial targets until it was relatively confident that the bombing would not be resumed. Repair activities at such important plants as the Thai Nguyen Iron and Steel Complex and the Bac Giang Chemical Fertilizer Plant have been at such a slow pace that neither facility is yet restored to the point that it would be a significant target. In other cases, such as the heavily damaged Nam Dinh Textile Plant and the Co Dinh Chromite Concentrating Plant, no reconstruction activity has been noted.

3. Another factor limiting the number of significant targets has been the extensive dispersal programs adopted to offset the effects of previous air attacks. Most of the major military barracks and ammunition and supply depots, for example, were dispersed early in 1965 so that when these target systems were taken under systematic attack the results, in terms of human or material losses, were minimal. Similarly, the early establishment of a widely dispersed petroleum storage system so effectively offset the destruction of North Vietnam's bulk storage system that most of these facilities were left unrepaired. As a result there are today probably only three petroleum storage areas -- Hanoi, Haiphong, and Vinh -- that are of some significance as potential targets. The widespread dispersal of small facilities such as vehicle repair and machine tool shops, as well as the relocation of some industrial plants has further reduced the number of installations available for air attack.

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II. Major Facilities

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- a. A high degree of physical damage or extensive disruption of an important economic or military function.
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6. The 29 installations selected are listed in the table.* The list is not intended to be all-inclusive but is judged to be one which would offer reasonably good prospects of maximizing the attainment of the above objectives. The specific targets are listed under several target systems and are listed by order of priority. The allocation of priority is obviously a highly subjective procedure, but the ranking in this listing is supported to some degree by the fact that it reflects the speed and intensity with which Hanoi chose to restore its bomb damaged facilities both during and after the US bombing campaigns. Although each installation is given a separate numerical ranking in many cases a successful campaign would require that several or all of the facilities in any one category be attacked simultaneously.

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11. The neutralization of these plants which constitute North Vietnam's main power network and represent a capital investment of about \$30 million would cripple most of North Vietnam's modern industry. The impact of bombing North Vietnam's electric power system would be maximized if strikes were carried out against all of these plants simultaneously. Successful attacks would not only undercut the results of 18 months of accelerated repair activity but would mean that another one to two years would elapse before the system could again approach pre-bombing capacity. The reconstruction effort is beyond the capabilities of North Vietnam's limited material and technical resources, particularly technicians. Even the resort to alternative power systems such as diesel-driven generating equipment would be adequate to meet only essential needs and would preclude the early restoration of normal industrial production. In addition the attacks could have a significant impact on the urban population of North Vietnam because of need to stagger work shifts to eliminate or strictly ration consumption by residential-commercial users, and transportation.

Airfields

12. Four of North Vietnam's ten jet airfields are judged to be significant targets. These are the airfields at Phuc Yen, Bai Thuong, Kien An, and Yen Bai. The airfields at Bai Thuong and Yen Bai have been under construction since May 1966 and were serviceable by May 1968. The Kien An and Phuc Yen airfields have been fully repaired and improved since the bombing halt. The construction of aircraft shelters and hardened facilities at these fields since the bombing halt has greatly increased their

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- Hanoi Petroleum Products Storage
- Vinh Petroleum Products Storage

19. The storage facilities at Haiphong would represent a rich target in an initial surprise attack. At least 50,000 tons of supplies, much of it high value imports, are stored in these facilities at any one time. The storage facility at An Khe is occupied primarily by cargo trucks. Although there is a rapid turnover of vehicles at An Khe the number in storage at any one time is high ranging from about 800 trucks in May of this year to over 1,300 trucks in early August. The petroleum storage facilities at Hanoi and Haiphong are under reconstruction and by June 1969 these facilities had an estimated storage capacity of 37,000 tons. If this capacity is being fully used these facilities would account for almost 40 percent of North Vietnam's estimated stockpiles of petroleum. The facility is significant because it is a major source of petroleum supplies for the Panhandle areas of North Vietnam.

Transportation Targets

20. There are a large number of bridges along North Vietnam's lines of communication whose neutralization would impede the internal distribution of economic and military supplies. For the most part interdiction of these bridges would be only a minor harassment. The North Vietnamese have demonstrated extreme skill in offsetting the effects of previous interdiction and during the bombing built a great deal of redundancy into

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their transport system. There are, however, three bridge targets that play key roles in maintaining the flow of Hanoi's imports either overland from China or through the port of Haiphong. These are:

Hanoi Railroad/Highway (Doumer)
Bridge over Red River

Hanoi Railroad/Highway
Bridge over Canal des Rapides

Haiphong Railroad Bridge
at Hai Duong

21. All of these bridges could be easily by-passed and the disruption to normal traffic flows would not be sustained for a long period. The importance of interdicting these bridges could become highly significant, however, if they were attacked simultaneously with an interdiction of the Haiphong Port area through a bombing or mining program.

22. In addition to these bridge targets, the major rail yards at Hanoi and Haiphong represent significant targets in North Vietnam's transport system. Successful attacks could achieve significant results in terms of damage to equipment and supplies. These rail complexes not only contain large quantities of materials but account for the bulk of North Vietnam's capacity for the repair of rolling stock and equipment. The effects of these strikes would be short-lived. Traffic flows could be resumed within days and needed transport equipment could be imported from Communist China.

Levees in the Red River Delta

23. The rice fields and populated centers of the delta are protected by an elaborate system of levees which have greatly reduced flooding from natural causes. A successful attack against the dikes in the Red River Delta could, at the proper time of the year, have exceedingly disruptive effects in the short run.

24. A highly successful campaign could destroy as much as 25 percent of the annual rice crop. Most economic and military activity in Hanoi and its suburbs would be temporarily halted. Key transport routes leading south and west from Hanoi would be disrupted. Sizeable diversions of labor would be necessary for a period of weeks to repair flood damage.

25. The most significant results would be accomplished by a

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breaching of the levees during the high water period between mid-July and mid-August. The fact that this period has passed explains the bottom ranking of this target system. But, the levee system is also given a low ranking because the technical problems of breaching levees by aerial bombing are so complex and the required sortie and ordnance effort so large, that such an attack generally holds little promise of success. In addition, the certainty of extremely adverse international reactions to the bombing of dams and dikes would be extremely unfavorable to the United States.

III. Conclusions

26. A review of economic and military facilities in North Vietnam has resulted in the selection of 29 installations that could be significant targets for air attack:

Five complexes in the Haiphong Port Area

Six electric power stations

Four airfields

Three manufacturing facilities

Five storage facilities

Five transportation targets

The levee system in the Red River Delta

27. The loss or neutralization of these facilities could have a deep psychological impact on Hanoi's leadership. Renewed air attacks would not only signal a return of the hardships and frustrations of previous bombing programs but also would yield significant amounts of physical and material damage. The fruit of several hundred million dollars in capital investment and post-bombing reconstruction programs would be lost. Most modern industrial production would come to a halt as would most foreign exchange earnings. The potential loss of large quantities of essential economic and military goods would increase sharply North Vietnam's import requirements. Finally, there would be extensive disruptions to normal living, to the provision of public services and transport, and substantial displacements of both urban and agricultural labor forces.

28. Despite the possibilities of widespread damage and loss, the neutralization of these facilities would not have a vital impact on Hanoi's war-making capabilities. These facilities make

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little direct contribution to the war because, with the exception of manpower, North Vietnam's military capabilities depend overwhelmingly on the continued flow of large amounts of economic and military assistance from its Communist allies.

29. The impact of attacks on these facilities would be highly dependent on the manner in which the program is executed. Hanoi has demonstrated an exceptional ability to adopt effective countermeasures to US bombing programs. Attacks against only one or two facilities in a target system would minimize the possible damage and fail to bite deeply enough into the available cushion of supplies or resources, thus easing the problems of recuperation. Therefore, an attack against all the facilities in a given target system (such as all powerplants) would be a more promising means of exerting pressure against the Hanoi regime. In other cases, the results to be expected from attacks against one target system (such as lines of communications) are maximized if they are combined with attacks against a complementary system (such as the Haiphong port facilities).

30. A neutralization program against these facilities would also carry liabilities. Most of the facilities are within heavily defended and densely populated areas around Hanoi and Haiphong. Attacks in these areas run a heavy risk of high losses of US aircraft and their crews, as well as the inadvertent killing or injuring of large numbers of Vietnamese civilians. Attacks against some of the facilities would almost certainly result in extremely adverse international reactions and could possibly force a US-USSR confrontation.

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Table

Significant Targets in North Vietnam

Haiphong Port Area

1. Haiphong Docks
2. Haiphong Open Storage Areas
3. Haiphong Naval Base
4. Haiphong Shipyards
5. Haiphong Air Defense Center

Electric Power Stations

6. Hanoi
7. Uong Bi
8. Haiphong West
9. Hon Gai
10. Thai Nguyen
11. Bac Giang

Airfields

12. Phuc Yen
13. Bai Thuong
14. Kien An
15. Yen Bai

Manufacturing Facilities

16. Haiphong Cement Plant
17. Cam Pha Coal Preparation Plant
18. Hanoi Machine Tool and Engineering Plant

Storage Facilities

19. Haiphong Chamber of Commerce Wharves
20. An Khe Army Barracks
21. Haiphong Petroleum Products Storage
22. Hanoi Petroleum Products Storage
23. Vinh Petroleum Products Storage

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Transportation Targets

- 24. Hanoi Railroad/Highway Bridge over Red River
- 25. Hanoi Railroad/Highway Bridge over Canal des Rapides
- 26. Haiphong Railroad Bridge at Hai Duong
- 27. Hanoi Rail Classification Yard
- 28. Haiphong Rail Yards

Agriculture

- 29. Levees in Red River Delta

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